Connected & Autonomous Vehicles: Developing the UK Supply Chain

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Connected & Autonomous Vehicles
Developing the UK Supply Chain

Dr George Gillespie OBE
March 14, 2016
We now live in a connected world ……

- 2020: 80 billion connected devices
- 2020: 5 billion internet users
- 2020: 500 devices with unique digital IDs per square kilometre

Brontobyte the new measurement for data

1,000,000,000,000,000,000,000,000,000,000,000
Our road environment is increasingly intelligent
The car is increasingly part of the connected ‘ecosystem’

- By 2020 20% of all vehicles on the road worldwide will have some form of wireless network connection ~ 250 million connected vehicles.

- The proliferation of vehicle connectivity will have implications across the major functional areas of telematics, automated driving, infotainment and mobility services.

Gartner Inc 2015
The major global trends driving R&D in the Automotive Industry

These drivers will shape transportation business for the next 25 years

Low Carbon Technology (electrification) + ADAS & Connectivity enabled by secure Embedded Systems

- Shell scenarios 2008 predicts 40% of transport fuel will be electricity or hydrogen by 2050
- Connected & Autonomous Vehicles (CAV) estimated to be a £50bn UK opportunity by 2030
- By 2020 40% -50% of the material cost in vehicles will be electrical systems
Rapidly increasing complexity of vehicles

- 100+ ECUs in a modern car
- Connected by over 1000 wires
  - 1km long, and weighing 45kg
Increasing role of software in vehicles

Seismic shift in the level of software complexity

Space Shuttle: 400,000 lines of code
Boeing 787: 14 million lines of code
F-35 Fighter: 24 million lines of code
Mercedes S-Class Radio & Nav only: 1 million lines of code
1981 (GM): 50,000 lines of code
1990: 1 million lines of code
2020: 150 million lines of code

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By 2020, 75% of all new cars will come with internet-connected infotainment systems.

Source: Machina Research, 2013
Critical Vehicle Data
• Engine Control Unit
• Transmission control unit
• Body controllers (locks/lights)
• Air bag control unit
• Steering, suspension and stability

Infotainment & Telematics
• Vehicle data from OBD II, GPS co-ordinates, driving patterns, diagnostics.
• Internet, smartphone interfacing, blue tooth Wi-Fi app store.
• Radio and media streaming.

External interfaces
• Emergency call (eCall)
• Key less entry
• Tyre pressure monitoring system
• V2X communication
• Satellite data
• Sensor and Camera data
Consider the Entire Supply Chain – A ‘Hackable’ Network

- Tier 1
- Tier 2
- Tier N

- Suppliers
- OEM
- Dealers
- Aftermarket
- Connected Devices

- Navigation Services
- Telecoms
- Interfaces
- OBD
- Recalls
- OTA updates

- Gateways
- Maintenance
- Cloud

- Services
- Apps
- Personalisation

Downstream

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Impact of CAVs to the UK in 2030

- Additional jobs impact: +320,000
- Jobs in automotive manufacturing created: +25,000
- Value added annually by 2030 (at 2014 prices): +£51bn
- Impact on GDP (2030): +1%
- Serious accidents prevented (2014-2030): +25,000

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Increasingly complex value chain – an opportunity and a threat

- Telematics
- Car Ownership
- Pay how you drive
- e-retail
- e-payment
- Streaming
- Eco-driving
- Fleet management
- Ticketing
- Location based services
- Reservations
- B2C
- B2B
- Fleet optimisation
- Pay as you go
- Entertainment services
- EV Charging
- Mobility Apps
- µ-mobility solutions
- Pay as you drive
- µ-mobility solutions
- e-payment

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Partnerships will be complex, non traditional and potentially disruptive
Commercialising these Opportunities is not obvious or easy

- The disconnect between lifecycles
- Built-in verses brought-in technology
- Need for security, safety and reliability makes the environment challenging
- New supply chains
- Need for collaborative business models between network operators and OEMs
- Payment models for services not yet developed
- Introduction of new business models ………
- New entrants

But the consumer lifestyle change is a given ….
The Automotive Council was formed in 2009:

To strengthen and promote **sustainable growth of the automotive sector in the UK** through enhanced dialogue and co-operation between UK government and automotive industry

**Industry Chair:**
Nigel Stein
CEO - GKN PLC

A joint government and industry body focused on:

- Establishing a **common long term vision** for the UK automotive industry
- Identifying **interventions** that will strengthen the UK automotive industry
Automotive Council UK

Approach:
- Creating Insight
- Establishing Strategy
- Driving Implementation

Structure:
- Business Environment & Skills
- Supply Chain
- Technology

A continuous value creation cycle involving all facets of the Automotive Council
Main Aims

• **Develop technology roadmaps**, future research challenges and identify where the UK can develop competitive advantage

• **Advise** on automotive R&D investment opportunities to foster a **stronger UK engineering, supply and manufacturing base**

• Preparation and **ownership of the UK Automotive Technology Strategy**
Unique Automotive Council study identified UK travelling public needs and wants

- 2015 £1.2m Government and industry funded project
- Identified Traveller Needs from 10,000 UK respondents
- Estimates the business value available
- Clarifies the Development Pathways
- Prioritises necessary technologies
- Unique Insight into the emerging needs of UK travellers – identifies opportunities
Travellers Needs outputs

- Default Motorists: 26%
- Progressive Metropolitans: 14%
- Local Drivers: 24%
- Dependent Passengers: 21%
- Urban Riders: 15%

Enabling Lifestyles

Intervention Opportunities
Intelligent and Connected Vehicles at HORIBA MIRA

- Vehicle in the Loop (VeHIL) test and validation for cooperative systems using ‘living laboratory’ environments (HORIBA MIRA City Circuit)
  - Safe, controlled urban test environment
  - Fully configurable wireless environment including communications and GPS denial
  - Fully monitored environment for scientific experimentation

- Cooperative driving using simulated environments and Hardware in the Loop (HIL)

- Automated cooperative driving for PG environments
Intelligent and Connected Vehicles at HORIBA MIRA

- Intelligent, autonomous construction machines for automated site preparation and construction technologies

- Deployment of connected and automated cars and pods in Milton Keynes and Coventry, HORIBA MIRA activities focused on connectivity, cyber security and safety
Intelligent and Connected Vehicles at HORIBA MIRA

- Connected corridor for traffic flow optimisation in the Coventry area activities focused on simulation and modelling of connected vehicles in urban and inter-urban environment and cyber security

- Improving traffic flow through Intelligent Variable Message Systems (iVMS) by developing and demonstrate technologies for vehicles to communicate directly with the road network to reduce congestion, leading the R&D activities
Thank you